

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Cechan (nmi) Tian et al.
Serial No.: 10/695,711
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Confirmation No.: 5574
Examiner: Agustin Bello
Title: *Method and System for Increasing Network Capacity in an
Optical Network*

Mail Stop Appeal Brief - Patents
Commissioner for Patents
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Dear Sir:

APPEAL BRIEF

Appellants have appealed to the Board of Patent Appeals and Interferences (the "Board") from the decision of the Examiner transmitted on November 19, 2007, finally rejecting pending Claims 1-46. Appellants filed a Notice of Appeal on February 15, 2008.

Real Party In Interest

This application is currently owned by Fujitsu Limited as indicated by an assignment recorded on October 29, 2003 in the Assignment Records of the United States Patent and Trademark Office at Reel/Frame 014651/0900.

Related Appeals and Interferences

To the knowledge of Appellants' counsel, there are no known appeals, interferences, or judicial proceedings that will directly affect or be directly affected by or have a bearing on the Board's decision regarding this Appeal.

Status of Claims

Claims 1-46 are pending in the Application and stand rejected pursuant to a final Office Action transmitted November 19, 2007 (the "Office Action") and are all presented for appeal. All claims presented for appeal are shown in Appendix A, attached hereto, along with an indication of the status of those claims.

Status of Amendments

All amendments submitted by Appellants have been entered by the Examiner.

Summary of Claimed Subject Matter

FIGURE 1 is a block diagram illustrating an optical network 10, in accordance with a particular embodiment of the present invention. In accordance with this embodiment, network 10 is an optical ring. An optical ring may include, as appropriate, a single, unidirectional fiber, a single, bi-directional fiber or a plurality of uni- or bi-directional fibers. In the illustrated embodiment, network 10 includes a pair of unidirectional fibers, each transporting traffic in opposite directions, specifically a first fiber, or ring, 16 and a second fiber, or ring, 18. Rings 16 and 18 connect a plurality of nodes 12. Network 10 is an optical network in which a number of optical channels are carried over a common path in disparate wavelengths/channels. Network 10 may be an wavelength division multiplexing (WDM), dense wavelength division multiplexing (DWDM) or other suitable multi-channel network. Network 10 may be used as a short-haul metropolitan network, a long-haul inter-city network or any other suitable network or combination of networks. In particular embodiments, nodes 12 may comprise a combination of one or more coupler nodes, sub-band nodes or hub nodes, as further described below. For example, in some embodiments network 10 may comprise a hub node, a coupler node and a plurality of sub-band nodes. While eight nodes 12 are illustrated in network 10, network 10 may include fewer or greater than eight nodes in other embodiments. In some embodiments, a single node 12 may comprise a combination of coupler node hardware, sub-band node hardware or hub node hardware, as further discussed below. Such combination may increase the number of ports through which optical traffic may be added and dropped from network 10. Moreover, the combination of hardware from different types of nodes into a single node may also reduce the need for certain hardware components, such as erbium-doped fiber amplifiers. (*Page 10, Line 2 – Page 11, Line 5*).

FIGURE 3 is a block diagram illustrating details of a sub-band node 200, in accordance with one embodiment of the present invention. Sub-band node 200 is one type of node which may be used as one or more of nodes 12 of FIGURE 1. Referring to FIGURE 3, optical rings 201 and 203 pass through sub-band node 200. Sub-band node 200 comprises counterclockwise transport element 202a, clockwise transport element 202b, counterclockwise distributing/combining element 80a and clockwise distributing/combining element. Particular embodiments may include a sub-band node with element and network

managing systems coupled to OSC filters, as discussed above with respect to coupler node 15 of FIGURE 2.

In the illustrated embodiment, transport elements 202 each comprises drop couplers 204 and add couplers 206 which allow for the passive dropping and adding, respectively, of traffic. Transport elements 202 also each includes sub-band rejection filters 208 which block a particular sub-band of optical traffic from passing through the transport elements. A sub-band is a portion of the bandwidth of the network. Each sub-band may carry none, one or a plurality of traffic channels. The traffic channels may be flexibly spaced within the sub-band. Traffic in sub-bands not rejected is passed through to other components of the network. Such passed-through traffic may be rejected at another node in the network. The rejection of a particular sub-band by rejection filters 208 enables traffic in such sub-band to be added and dropped at node 200 without interference with traffic in the sub-band being communicated on the network. Traffic in the sub-band rejected by sub-band filters 208 may be dropped from the network by couplers 204, and added to the network at couplers 206. Transport elements 202 also include amplifiers 64.

Sub-band node 200 also includes additional elements as previously described with respect to coupler node 15 of FIGURE 2, such as distributing/combining elements 80. Locally-derived add traffic is received at distributing/combining elements 80 from one or more of optical transmitters 104. Locally-destined traffic on a ring 201 or 203 is dropped to the associated distributing/combining element 80 and forwarded to one or more optical receivers 102. (*Page 21, Line 25 – Page 23, Line 3*).

FIGURE 4 illustrates a hub node 300, in accordance with one embodiment of the present invention. Hub node 300 is one type of node that may be used as one or more of nodes 12 of FIGURE 1. Referring to FIGURE 4, optical rings 301 and 303 pass through hub node 300. Hub node 300 comprises counterclockwise transport element 302a and clockwise transport element 302b. Particular embodiments may include a hub node with element and network managing systems coupled to OSC filters, as discussed above with respect to coupler node 15 of FIGURE 2.

In the illustrated embodiment, transport elements 302 each comprises drop couplers 304 and add couplers 306 which allow for the passive dropping and adding, respectively, of traffic. Transport elements also each includes mux/demux units 314. Mux/demux units 314

may each comprise demultiplexer 305, multiplexer 307 and switch elements which may comprise an array of switches 310 or other components, such as wavelength or sub-band blockers, operable to selectively pass or terminate a traffic channel or sub-band. In a particular embodiment, multiplexers 307 and demultiplexers 305 may comprise arrayed waveguides. In another embodiment, multiplexers 307 and demultiplexers 305 may comprise fiber Bragg gratings. Switches 310 may comprise 2 x 2 or other suitable switches or optical cross-connects operable to terminate the demultiplexed traffic channels or sub-bands. Transport elements 302 also include amplifiers 64.

In operation, counterclockwise transport element 302a receives a WDM signal comprising a plurality of channels from ring 301. Demultiplexer 305 demultiplexes the optical signal into its constituent channels or sub-bands. Switches 310 selectively forward or terminate channels or sub-bands to multiplexer 307. Multiplexer 307 multiplexes the channels or sub-bands into one optical signal for communication through ring 301. Clockwise transport segment 302b receives an optical signal from ring 303. Demultiplexer 305 demultiplexes the optical signal into its constituent channels or sub-bands. Switches 310 selectively forward or terminate channels or sub-bands to multiplexer 307. Multiplexer 307 multiplexes the channels or sub-bands into one optical signal for communication through ring 303.

Hub node 300 also includes additional elements as previously described with respect to coupler node 15 of FIGURE 2, such as distributing/combining elements 80. Locally-derived add traffic is received at distributing/combining elements 80 from one or more of optical transmitters 104. Locally-destined traffic on a ring 301 or 303 is dropped to the associated distributing/combining element 80 and forwarded to one or more optical receivers 102. *(Page 23, Line 4 – Page 24, Line 24).*

FIGURE 5 is a block diagram illustrating an optical network 500, in accordance with a particular embodiment of the present invention. Optical network 500 provides for the communication of optical traffic through rings 501 and 503. Optical network 500 includes sub-band nodes 510a-510c, similar to sub-band node 200 of FIGURE 3, and hub node 520, similar to hub node 300 of FIGURE 4. For ease of reference, only high-level details of transport elements of sub-band nodes 510 and hub node 520 are shown.

In the illustrated embodiment, each of sub-band nodes 510a-510c blocks a respective sub-band thus allowing for the adding and dropping of optical traffic in such respective sub-band while maintaining OUPSR protection between the nodes. Switches in hub node 520 for the sub-bands installed at sub-band nodes 510 may be in a pass-through position to allow for the communication of traffic in such sub-bands around the rings. Hub node 520 may provide for the adding and dropping of traffic in the remaining five sub-bands of the full C-band by terminating such sub-bands at its switches. OUPSR protection is still maintained between the nodes. Hub node 520 may also be used as a ring interconnect node to connect rings 501 and 503 to other optical components or rings. In particular embodiments, additional or fewer sub-band nodes 510 may be utilized. In such cases, the sub-bands added or dropped at hub node 520 may change based on the additional or fewer sub-band nodes 510 utilized. For example, if only two sub-band nodes are included in optical network 500, then hub-band node 520 may add and drop six sub-bands to utilize the full C-band in the network. When utilizing a hub node, a maximum number of nodes in a network may be $N + 1$ where N is the total number of installed sub-bands. While the illustrated embodiment includes three sub-band nodes and a single hub node, it should be understood that networks in accordance with other embodiments may include any combination of sub-band nodes and hub nodes. *(Page 25, Line 12 – Page 26, Line 17).*

FIGURE 7 is a block diagram illustrating an optical network 700, in accordance with a particular embodiment of the present invention. Optical network 700 provides for the communication of optical traffic through rings 701 and 703. Optical network 700 includes sub-band node 710a, coupler node 730 and a combination hub node 740. For ease of reference, only high-level details of transport elements of the utilized nodes are shown.

In the illustrated embodiment, sub-band node 710 blocks a sub-band of optical traffic thus allowing for the adding and dropping of optical traffic in such respective sub-band. Switches in combination hub node 740 for the sub-band installed at sub-band node 710 may be in a pass-through position to allow for the communication of traffic in such sub-band around the rings.

Coupler node 730 passively adds and drops optical traffic as described above with respect to coupler node 15 of FIGURE 2. To add and drop such traffic, coupler node 730 includes transport elements 702 which are similar to transport elements 50 of coupler node 15

of FIGURE 2. The traffic added and dropped at coupler node 730 may include wavelengths within or outside of sub-bands already being added at other nodes, sub-band node 710 or combination hub node 740.

Combination hub node 740 combines components previously described with respect to coupler nodes and hub nodes into a single node. In doing so, the number of ports which may add and drop traffic from a single node is increased. Combination hub node 740 includes transport elements 302a and 302b described previously with respect to hub node 300 of FIGURE 4A. Thus, combination hub node 740 provides hub node functionality through the use of mux/demux units which may selectively termination particular channels or sub-bands of optical traffic. In the illustrated embodiment, combination hub node also includes coupler unit 745 which provides functionality of coupler nodes to network 700. Coupler unit 745 comprises transport elements 746 which are similar in function to transport elements of coupler nodes previously described. In particular embodiments, the combination of coupler unit 745 with the hub node functionality may alleviate the need for amplifiers 748 in the coupler node transport elements. Such amplifiers might otherwise be required in a typical coupler node independent from a hub node. The elimination of such amplifiers may considerably reduce the cost of the components of the node.

As discussed above, the combination of coupler node and hub node functionality may increase the number of ports available for adding and dropping traffic at the node. The protection schemes of the network with the resultant combination node may be similar to the protection schemes if the combined nodes were instead independent nodes. (*Page 28, Line 16 – Page 30, Line 7*).

FIGURE 8 illustrates a sub-band unit 780 which may be utilized in place of coupler unit 745 of FIGURE 7. Sub-band unit 780 includes transport elements 784 which are similar in functionality to transport elements described with respect to sub-band nodes, such as transport elements 202 of sub-band node 200 of FIGURE 3. If sub-band unit 780 is utilized in place of coupler unit 745 of combination hub node 740 of FIGURE 7, then the resultant combination hub node would provide both hub node and sub-band node functionality to optical network 700. The protection schemes of the network with the resultant combination node may be similar to the protection schemes if the combined nodes were instead independent nodes. As in the case with coupler unit 745, the use of sub-band unit 780 in

combination hub node 740 may alleviate the need for amplifiers 782 in the transport elements of the sub-band unit, thus saving substantial hardware costs. (*Page 30, Lines 8-25*).

FIGURE 11 illustrates an optical network 1100 with two hub nodes forming two photonic domains, in accordance with a particular embodiment of the present invention. Optical network 1100 includes optical rings 1101 and 1103. In this embodiment, optical ring 1103 is a clockwise ring, and optical ring 1101 is a counterclockwise ring. Optical network 1100 includes hub nodes 1102 and 1104 and sub-band nodes 1106a, 1106b, 1108a and 1108b. Hub nodes 1102 and 1104 may be similar to other hub nodes discussed herein, such as hub node 300 of FIGURE 4A. In some embodiments hub nodes 1102 and 1104 may be sub-band based hub nodes such that mux/demux units of such hub nodes separate and either pass or terminate optical traffic according to sub-bands of the traffic, while in other embodiments hub nodes 1102 and 1104 may be channel based hub nodes such that mux/demux units of such hub nodes separate and either pass or terminate optical traffic according to individual channels of the traffic. Sub-band nodes 1106 and 1108 may be similar to other sub-band nodes discussed herein, such as sub-band node 200 of FIGURE 3.

The use of two hub-band nodes 1102 and 1104 divides optical network 1100 into two photonic domains 1110 and 1112. Each such domain includes network components in between hub nodes 1102 and 1104 on respective sides. For example, in this embodiment domain 1110 includes ring segments 1101a-1101c and 1103a-1103c and sub-band nodes 1106a-1106b, and domain 1112 includes ring segments 1101d-1101f and 1103d-1103f and sub-band nodes 1108-1108b. While the illustrated embodiment utilizes two hub-band nodes to form two domains of optical network 1100, it should be understood that other embodiments may include more than two hub nodes to form more than two domains of an optical network. Moreover, other embodiments may include a different number of sub-band nodes and/or other types of nodes, such as coupler nodes. For example, other embodiments may not include sub-band nodes with sub-band rejection filters. Some embodiments may include combination nodes or any other type of node, for example nodes having transport elements as described with respect to FIGURES 9A-9C and 10, in addition to multiple hub nodes.

In operation, traffic may be communicated through rings 1101 and 1103 as discussed above with respect to optical networks of other embodiments. Each sub-band node may

terminate a respective sub-band of such traffic to enable the adding and dropping of traffic in such sub-band at the node without interference. Each hub node may selectively pass or terminate individual sub-bands or channels of the optical traffic using switches 1105. As described above with respect to other hub nodes, optical traffic entering the hub nodes is demultiplexed into its constituent channels or sub-bands, and switches 1105 selectively pass or terminate each constituent channel or sub-band. The passed traffic is then multiplexed into one traffic stream for communication through the network.

The use of two hub nodes enables traffic in certain sub-bands or channels communicated through network 1100 to be utilized in one or both domains 1110 and 1112. For example, hub nodes 1102 and 1104 may each selectively pass through optical traffic in one or more particular channels or sub-bands thus allowing traffic added and dropped at a particular sub-band node to be communicated to all nodes of network 1100.

However, both hub nodes 1102 and 1104 may also terminate optical traffic in one or more channels or sub-bands such that traffic added at a sub-band node of a particular domain will not be communicated to the nodes of the other domain. For example, if switches 1105 of hub nodes 1102 and 1104 are configured such that traffic in a certain channel does not pass through either hub node, then traffic added in that channel at sub-band node 1106a will not pass through either of hub nodes 1102 and 1104 such that the traffic will not be communicated to any nodes of domain 1112. Likewise in this scenario, traffic added in that same channel at sub-band node 1108a will not reach any nodes of domain 1110. It should be understood that switches 1105 of hub nodes 1102 and 1104 are reconfigurable such that traffic may be selectively terminated or passed depending on particular needs or circumstances. For example, as further discussed below, switches 1105 may be reconfigured to maintain protection of the network in the event of a fiber cut or other error that may prevent communication of traffic through at least a portion of the network. Such protection may ensure that certain nodes still receive certain traffic in the event of such fiber cut or error.

Since traffic in particular channels or sub-bands may be isolated within the domains in which it is added or dropped, then such channels or sub-bands may be reused to communicate traffic in the other domains of the network without interference. Thus, the use of multiple hub nodes forms separate photonic domains in which channels and sub-bands may be reused to communicate traffic in such domains. This ability to reuse channels and

sub-bands increases capacity of the optical network. It should be noted that when network 1100 is providing OUPSR protection for traffic in a particular sub-bands or channels, then hub nodes 1102 and 1104 may pass such traffic to maintain the OUPSR protection. In this case, the particular sub-bands or channels passed by hub nodes 1102 and 1104 may not be reused since the traffic travels through both domains. (*Page 33, Line 11 – Page 36, Line 18*).

With regard to the independent claims currently under appeal, Appellants provide the following concise explanation of the subject matter recited in the claim elements. For brevity, Appellants do not necessarily identify every portion of the Specification and drawings relevant to the recited claim elements. Additionally, this explanation should not be used to limit Appellants' claims but is intended to assist the Board in considering the appeal of this Application.

For example, independent Claim 1 recites the following:

An optical network, comprising:
an optical ring operable to communicate optical traffic (e.g., Page 10, Line 2 – Page 11, Line 5);
a plurality of nodes coupled to the optical ring, each node operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel (e.g., Page 10, Line 2 – Page 11, Line 5; Page 25, Line 12 – Page 26, Line 17); and
the plurality of nodes comprising:
a hub node operable to selectively pass or terminate a plurality of individual sub-bands of the optical traffic (e.g., Page 23, Line 4 – Page 24, Line 24; Page 25, Line 12 – Page 26, Line 17); and
a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic (e.g., Page 21, Line 25 – Page 23, Line 3; Page 25, Line 12 – Page 26, Line 17).

As another example, independent Claim 8 recites the following:

An optical network, comprising:
an optical ring operable to communicate optical traffic (e.g., Page 10, Line 2 – Page 11, Line 5);
a plurality of nodes coupled to the optical ring, each node comprising at least one transport element operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel (e.g., Page 10, Line 2 – Page 11, Line 5; Page 28, Line 16 – Page 30, Line 7); and
the plurality of nodes comprising a combination node, the combination node comprising:

a coupler node transport element operable to drop and continue optical traffic passing through the coupler node transport element (e.g., Page 28, Line 16 – Page 30, Line 7); and

a hub node transport element cascaded with the coupler node transport element, the hub node transport element operable to selectively pass or terminate from continuing on the optical ring a plurality of individual sub-bands of the optical traffic (e.g., Page 23, Line 4 – Page 24, Line 24; Page 25, Line 12 – Page 26, Line 17; Page 28, Line 16 – Page 30, Line 7).

As another example, independent Claim 12 recites the following:

An optical network, comprising:

an optical ring operable to communicate optical traffic (e.g., Page 10, Line 2 – Page 11, Line 5);

a plurality of nodes coupled to the optical ring, each node comprising at least one transport element operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel (e.g., Page 10, Line 2 – Page 11, Line 5; Page 28, Line 16 – Page 30, Line 7; Page 30, Lines 8-25); and

the plurality of nodes comprising a combination node, the combination node comprising:

a sub-band node transport element operable to terminate a respective sub-band of the optical traffic (e.g., Page 21, Line 25 – Page 23, Line 3; Page 25, Line 12 – Page 26, Line 17; Page 28, Line 16 – Page 30, Line 7; Page 30, Lines 8-25); and

a hub node transport element cascaded with the sub-band node transport element, the hub node transport element operable to selectively pass or terminate a plurality of individual sub-bands of the optical traffic (e.g., Page 23, Line 4 – Page 24, Line 24; Page 25, Line 12 – Page 26, Line 17; Page 28, Line 16 – Page 30, Line 7).

As another example, independent Claim 16 recites the following:

A method for communicating traffic on an optical network, comprising:

communicating traffic through an optical ring (e.g., Page 10, Line 2 – Page 11, Line 5);

passively adding and dropping one or more traffic streams to and from the optical ring at a plurality of nodes coupled to the optical ring, each traffic stream comprising at least one channel (e.g., Page 10, Line 2 – Page 11, Line 5; Page 25, Line 12 – Page 26, Line 17);

selectively passing or terminating a plurality of individual sub-bands of the optical traffic at a hub node of the plurality of nodes (e.g., Page 23, Line 4 – Page 24, Line 24; Page 25, Line 12 – Page 26, Line 17); and

terminating a plurality of sub-bands of the optical traffic at a plurality of sub-band nodes of the plurality of nodes, each of the plurality of sub-band nodes terminating a respective sub-band (e.g., Page 21, Line 25 – Page 23, Line 3; Page 25, Line 12 – Page 26, Line 17).

As another example, independent Claim 23 recites the following:

An optical network, comprising:
an optical ring operable to communicate optical traffic (e.g., Page 10, Line 2 – Page 11, Line 5);
a plurality of nodes coupled to the optical ring, each node operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel (e.g., Page 10, Line 2 – Page 11, Line 5; Page 25, Line 12 – Page 26, Line 17); and
the plurality of nodes comprising:
a hub node operable to selectively pass or terminate a plurality of individual channels of the optical traffic (e.g., Page 23, Line 4 – Page 24, Line 24; Page 25, Line 12 – Page 26, Line 17); and
a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic (e.g., Page 21, Line 25 – Page 23, Line 3; Page 25, Line 12 – Page 26, Line 17).

As another example, independent Claim 29 recites the following:

An optical network, comprising:
an optical ring operable to communicate optical traffic (e.g., Page 10, Line 2 – Page 11, Line 5);
a plurality of nodes coupled to the optical ring, each node comprising at least one transport element operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel (e.g., Page 10, Line 2 – Page 11, Line 5; Page 28, Line 16 – Page 30, Line 7); and
the plurality of nodes comprising a combination node, the combination node comprising:
a coupler node transport element operable to drop and continue optical traffic passing through the coupler node transport element (e.g., Page 28, Line 16 – Page 30, Line 7); and
a hub node transport element cascaded with the coupler node transport element, the hub node transport element operable to selectively pass or terminate from continuing on the optical ring_a plurality of individual channels of the optical traffic (e.g., Page 23, Line 4 – Page 24, Line 24; Page 25, Line 12 – Page 26, Line 17; Page 28, Line 16 – Page 30, Line 7).

As another example, independent Claim 32 recites the following:

An optical network, comprising:
an optical ring operable to communicate optical traffic (e.g., Page 10, Line 2 – Page 11, Line 5);
a plurality of nodes coupled to the optical ring, each node comprising at least one transport element operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at

least one channel (e.g., Page 10, Line 2 – Page 11, Line 5; Page 28, Line 16 – Page 30, Line 7; Page 30, Lines 8-25); and

the plurality of nodes comprising a combination node, the combination node comprising:

a sub-band node transport element operable to terminate a respective sub-band of the optical traffic (e.g., Page 21, Line 25 – Page 23, Line 3; Page 25, Line 12 – Page 26, Line 17; Page 28, Line 16 – Page 30, Line 7; Page 30, Lines 8-25); and

a hub node transport element cascaded with the sub-band node transport element, the hub node transport element operable to selectively pass or terminate a plurality of individual channels of the optical traffic (e.g., Page 23, Line 4 – Page 24, Line 24; Page 25, Line 12 – Page 26, Line 17; Page 28, Line 16 – Page 30, Line 7).

As another example, independent Claim 35 recites the following:

An optical network, comprising:

an optical ring operable to communicate optical traffic (e.g., Page 10, Line 2 – Page 11, Line 5);

a plurality of nodes coupled to the optical ring, each node operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel (e.g., Page 10, Line 2 – Page 11, Line 5; Page 25, Line 12 – Page 26, Line 17; Page 33, Line 11 – Page 36, Line 18);

the plurality of nodes comprising:

a plurality of hub nodes operable to selectively pass or terminate a plurality of individual sub-bands of the optical traffic (e.g., Page 23, Line 4 – Page 24, Line 24; Page 25, Line 12 – Page 26, Line 17; Page 33, Line 11 – Page 36, Line 18); and

a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic (e.g., Page 21, Line 25 – Page 23, Line 3; Page 25, Line 12 – Page 26, Line 17; Page 33, Line 11 – Page 36, Line 18);

wherein the plurality of hub nodes form a plurality of photonic domains each operable to communicate different traffic streams in the same sub-bands without interference (e.g., Page 33, Line 11 – Page 36, Line 18).

As another example, independent Claim 41 recites the following:

An optical network, comprising:

an optical ring operable to communicate optical traffic (e.g., Page 10, Line 2 – Page 11, Line 5);

a plurality of nodes coupled to the optical ring, each node operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel (e.g., Page 10, Line 2 – Page 11, Line 5; Page 25, Line 12 – Page 26, Line 17; Page 33, Line 11 – Page 36, Line 18);

the plurality of nodes comprising:

a plurality of hub nodes operable to selectively pass or terminate a plurality of individual channels of the optical traffic (e.g., Page 23, Line 4 – Page 24, Line 24; Page 25, Line 12 – Page 26, Line 17; Page 33, Line 11 – Page 36, Line 18); and

a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic (e.g., Page 21, Line 25 – Page 23, Line 3; Page 25, Line 12 – Page 26, Line 17; Page 33, Line 11 – Page 36, Line 18);

wherein the plurality of hub nodes form a plurality of photonic domains each operable to communicate different traffic streams in the same channels without interference (e.g., Page 33, Line 11 – Page 36, Line 18).

Grounds of Rejection to be Reviewed on Appeal

1. Appellants request that the Board review the Examiner's rejections of Claims 1-3, 5-10, 12-14, 16-18, and 20-46 under 35 U.S.C. 102(e) as being anticipated by U.S. Publication No. 2003/0025961 to Way ("*Way*").

2. Appellants request that the Board review the Examiner's rejections of Claims 4, 11, 15 and 19 under 35 U.S.C. 103(a) as being unpatentable over *Way* in view of U.S. Patent No. 6,868,201 to Johnson ("*Johnson*").

Argument

I. The Examiner's Rejections of Claims 35-46 are Improper

The Office Action rejects Claims 35-46 under 35 U.S.C. 102(e) as being anticipated by U.S. Publication No. 2003/0025961 to Way ("*Way*").

Claim 35 recites a plurality of hub nodes operable to selectively pass or terminate a plurality of individual sub-bands of optical traffic, a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic, and wherein the plurality of hub nodes form a plurality of photonic domains each operable to communicate different traffic streams in the same sub-bands without interference. Claim 41 recites similar elements. The Office Action suggests that *Way* discloses each of these elements. *See* Office Action, page 4. The Office Action generally cites to paragraph [0071] of *Way* as disclosing the claim element wherein the plurality of hub nodes form a plurality of photonic domains each operable to communicate different traffic streams in the same sub-bands without interference. This paragraph references Figure 13 of *Way* illustrating a node that merely couples three different rings in order to facilitate sharing of wavelengths on the three rings. There is no disclosure of a plurality of hub nodes on the same ring forming a plurality of photonic domains each operable to communicate different traffic streams in the same sub-bands without interference. In responding to Appellants' previous arguments regarding these rejections, the Office Action states that:

[T]he examiner has considered each ring (e.g. the left-hand, the right-hand, and the bottom ring) as a separate optical domain with the plurality of elements that connect them interpreted as hub nodes. Furthermore, *while the applicant contends that the plurality of nodes are on the same ring, the claim language fails to reflect this limitation.*

Office Action, page 6 (emphasis added).

Appellants respectfully disagree. Claim 35 recites an optical ring with a plurality of nodes coupled to the ring where each node is operable to passively add and drop traffic to and from the ring. The plurality of nodes comprise hub nodes and sub-band nodes, and the hub nodes form a plurality of photonic domains each operable to communicate different traffic

streams in the same sub-bands without interference. As indicated above, the Office Action generally refers to paragraph [0071] and Figure 13 of *Way* and contends that each ring is a separate optical domain with a vague reference to "the plurality of elements that connect them" as hub nodes. *See* Office Action, page 6. However, the Office Action fails to identify which components are the claimed hub nodes and which components are the claimed sub-band nodes, particularly in light of the claim elements stating that each of such claimed nodes are operable to passively add and drop traffic to and from the same ring. Moreover, there is no disclosure of a plurality of hub nodes, each operable to passively add and drop traffic from the ring, forming a plurality of photonic domains. The Office Action fails to demonstrate how the mere disclosure in Figure 13 of *Way* of three rings with splitters, couplers, and 1x1 switches satisfies the necessary disclosure required to support the rejections.

Because *Way* does not disclose each element of Claims 35 and 41, Appellants respectfully submit that these claims are patentable over the cited art used in the rejections and request that the Board overturn the rejections of these claims.

Claims 36-40 each depends, either directly or indirectly, from Claim 35, and Claims 42-46 each depends, either directly or indirectly, from Claim 41. Thus, for at least the reasons discussed above with respect to Claims 35 and 41, Appellants respectfully request that the Board overturn the rejections of Claims 36-40 and 42-46.

II. The Examiner's Rejections of Claims 1-34 are Improper

The Office Action rejects Claims 1-3, 5-10, 12-14, 16-18, and 20-34 under 35 U.S.C. 102(e) as being anticipated by U.S. Publication No. 2003/0025961 to Way ("*Way*"). The Office Action rejects Claims 4, 11, 15 and 19 under 35 U.S.C. 103(a) as being unpatentable over *Way* in view of U.S. Patent No. 6,868,201 to Johnson ("*Johnson*").

A. The References Do Not Does not Disclose Each Element of Claims 1-7, 16-22 and 23-28

Claim 1 recites an optical network comprising:

- an optical ring operable to communicate optical traffic;
- a plurality of nodes coupled to the optical ring, each node operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel; and
- he plurality of nodes comprising:
 - a hub node operable to selectively pass or terminate a plurality of individual sub-bands of the optical traffic; and
 - a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic.

Claims 16 and 23 recite similar elements. The Office Action suggests that *Way* discloses each of these elements. *See* Office Action, page 2. Specifically, the Office Action suggests that reference numeral 24 is a hub node operable to selectively pass or terminate a plurality of individual sub-bands of the optical traffic. *See id.* Appellants note that reference numeral 24 is a "central hub" with "[a]t least one 1x1 or 1x2 switch 22 coupled to" rings 14 and 16. *Way*, par. [0057]. As evident in Figure 6, node 24 either passes or stops traffic communicated on rings 14 and 16 depending on whether switch(es) 22 are open or closed. As indicated above, Claim 1 recites a plurality of nodes each operable to passively add and drop one or more traffic streams to and from the optical ring, and the hub node which is operable to selectively pass or terminate a plurality of individual sub-bands is one of these plurality of nodes. Thus, the claimed hub node is operable to both passively add and drop one or more traffic streams and selectively pass or terminate a plurality of individual sub-bands. However, the referenced node 24 of Figure 6 of *Way* merely passes or stops traffic. Therefore, *Way* does not disclose a hub node operable to passively add and drop one or more traffic streams to and from an optical ring and operable to selectively pass or terminate a plurality of individual sub-bands is one of these plurality of nodes.

In addition, the Office Action suggests that "reference numeral 26 in Figure 6" of *Way* discloses a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic. Office Action, page 2. However, reference numeral 26 of Figure 6 of *Way* discloses nodes 26 each with "one or more transmitters and receivers, mux/demux and fiber coupler." *Way*, par. [0057]. The couplers merely pass and drop traffic to

components at the node. There is no disclosure of sub-band nodes operable to terminate a respective sub-band of optical traffic. In response to Appellants' previous arguments on this issue, the Examiner states that "[e]ach node 26 in Figure 6 terminates traffic by first coupling the opt[ical] signal from the ring to associated optical receivers where the optical signals are received and thereby terminated." Office Action, pages 5-6. However, Appellants note that as claimed the sub-band nodes are also each operable to passively add and drop one or more traffic streams to and from the optical ring. As indicated above, the Examiner merely cites to nodes 26 in *Way* with transmitters, receivers, a mux/demux, and a fiber coupler. The traffic passing through these nodes is also dropped to the mux/demux and receivers. There is no disclosure in *Way* that these nodes passively add and drop one or more traffic strings to and from a ring and terminate a respective sub-band of the optical traffic. Contrary to the Examiner's suggestion, the receipt of an optical signal at a receiver in *Way* cannot suffice as termination given that the optical signal also continues along the ring as disclosed in *Way*.

Because *Way* does not disclose each element of Claims 1, 16, and 23, Appellants respectfully submit that these claims are patentable over the cited art used in the rejections and request that the Board overturn the rejections of these claims.

Claims 2-7 each depends from Claim 1, Claims 17-22 each depends from Claim 16 and Claims 24-28 each depends from Claim 23. Thus, for at least the reasons discussed above with respect to Claims 1, 16 and 23, Appellants respectfully request that the rejections of Claims 2-7, 17-22 and 24-28 be withdrawn.

B. The References Do Not Does not Disclose Each Element of Claims 8-11 and 29-31

Claim 8 recites a plurality of nodes each comprising at least one transport element operable to passively add and drop one or more traffic streams, the plurality of nodes comprising a combination node comprising a coupler node transport element operable to drop and continue optical traffic passing through the coupler node transport element and a hub node transport element cascaded with the coupler node transport element and operable to selectively pass or terminate a plurality of individual sub-bands of the optical traffic. Claim 29 recites similar elements. The Office Action suggests that *Way* discloses a combination

node comprising a coupler node transport element operable to drop and continue optical traffic passing through the transport element and a hub node transport element operable to selectively pass or terminate a plurality of individual sub-bands of the optical traffic. *See* Office Action, pages 3-4. The Office refers to reference numeral 166 of Figure 23 of *Way* as disclosing the hub node transport element. *See id.* However, Figure 23 does not disclose the claimed combination node because it does not disclose a hub node transport element operable to selectively pass or terminate from continuing on the optical ring a plurality of individual sub-bands. It is clear from the portion of the ring referenced as "Main Path of a Ring" in Figure 23 of *Way* that all the ring traffic still continues on the ring despite the dropping of the traffic at the couplers. Reference numeral 166 does not prevent this. In response to Appellants' previous arguments on this issue, the Examiner states that:

[T]he hub transport element is clearly indicated as the combination of reference numeral 166 and the circulator in Figure 23. These two elements, when taken together, function to selectively pass (e.g. all wavelengths except wavelength 1) or terminate (e.g. wavelength 1 being received and thereby terminated by element 166 in Figure 23) a plurality of individual subbands.

Office Action, page 6. Appellants respectfully disagree. As evident in Figure 23 of *Way*, the illustrated components include broadband coupler 120 which allows the traffic to both be dropped to the circulators and to be passed along the main ring path. For example, *Way* states that "[b]roadband coupler 120 has an add port and a drop port to add and drop wavelengths to and or from the first ring." *Way*, par. [0079]. Thus, the cited portions of *Way* (e.g., Figure 23) do not disclose a hub node transport element operable to selectively pass or terminate from continuing on the optical ring a plurality of individual sub-bands because all traffic that the Examiner contends is terminated at reference numeral 166 is still passed on the ring through coupler 120. There is no selective passing or terminating from continuing on the ring of individual sub-bands.

Because *Way* does not disclose each element of Claims 8 and 29, Appellants respectfully submit that these claims are patentable over the cited art used in the rejections and request that the Board overturn the rejections of these claims.

Claims 2-7 each depends from Claim 1, Claims 17-22 each depends from Claim 16 and Claims 24-28 each depends from Claim 23. Thus, for at least the reasons discussed

above with respect to Claims 1, 16 and 23, Appellants respectfully request that the rejections of Claims 2-7, 17-22 and 24-28 be withdrawn.

Claims 9-11 each depends from Claim 8, and Claims 30-31 each depends from Claim 29. Thus, for at least the reasons discussed above with respect to Claims 8 and 29, Appellants.

C. The References Do Not Does not Disclose Each Element of Claims 12-15 and 32-34

Claim 12 recites an optical network comprising:

- an optical ring operable to communicate optical traffic;
- a plurality of nodes coupled to the optical ring, each node comprising at least one transport element operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel; and
- the plurality of nodes comprising a combination node, the combination node comprising:
 - a sub-band node transport element operable to terminate a respective sub-band of the optical traffic; and
 - a hub node transport element cascaded with the sub-band node transport element, the hub node transport element operable to selectively pass or terminate a plurality of individual sub-bands of the optical traffic.

Claim 32 recites similar elements. The Office Action premises the rejections of these claims on the same disclosures used to reject Claims 1 and 8. *See* Office Action, page 2. The claimed hub node is operable to both passively add and drop one or more traffic streams and selectively pass or terminate a plurality of individual sub-bands. However, as discussed above in Section II.A., the referenced node 24 of Figure 6 of *Way* merely passes or stops traffic. Therefore, *Way* does not disclose a hub node operable to passively add and drop one or more traffic streams to and from an optical ring and operable to selectively pass or terminate a plurality of individual sub-bands is one of these plurality of nodes. In addition, as also discussed above in Section II.A., there is no disclosure that nodes 26 of *Way* passively add and drop one or more traffic strings to and from a ring and terminate a respective sub-band of the optical traffic.

Because *Way* does not disclose each element of Claims 12 and 32, Appellants respectfully submit that these claims are patentable over the cited art used in the rejections and request that the Board overturn the rejections of these claims.

Claims 13-15 each depends from Claim 12, and Claims 33-34 each depends from Claim 32. Thus, for at least the reasons discussed above with respect to Claims 12 and 32, Appellants respectfully request that the rejections of Claims 13-15 and 33-34 be withdrawn.

CONCLUSION

Appellants have demonstrated that the present invention, as claimed, is clearly distinguishable over the prior art cited by the Examiner. Therefore, Appellants respectfully request the Board of Patent Appeals and Interferences to reverse the Examiner's final rejection of the pending claims and instruct the Examiner to issue a notice of allowance of all pending claims.

The Commissioner is hereby authorized to charge \$510.00 in payment for this Appeal Brief, any other fee and credit any overpayment, to Deposit Account No. 02-0384 of Baker Botts L.L.P.

Respectfully submitted,
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Appendix A: Claims on Appeal

1. (Original) An optical network, comprising:
an optical ring operable to communicate optical traffic;
a plurality of nodes coupled to the optical ring, each node operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel; and
the plurality of nodes comprising:
a hub node operable to selectively pass or terminate a plurality of individual sub-bands of the optical traffic; and
a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic.
2. (Original) The optical network of Claim 1, wherein the plurality of nodes further comprises a coupler node operable to drop and continue optical traffic passing through the coupler node.
3. (Original) The optical network of Claim 1, wherein the hub node comprises:
a demultiplexer operable to demultiplex the optical traffic into its constituent sub-bands;
a plurality of switches each operable to pass or terminate a respective sub-band; and
a multiplexer operable to multiplex each sub-band passed at the plurality of switches for communication on the optical ring.
4. (Original) The optical network of Claim 3, wherein the demultiplexer and the multiplexer comprise array waveguides.
5. (Original) The optical network of Claim 1, wherein the plurality of sub-band nodes each comprise a sub-band filter operable to block optical traffic in a respective sub-band.
6. (Original) The optical network of Claim 1, further comprising a combination sub-band node operable to terminate a plurality of sub-bands of the optical traffic.

7. (Original) The optical network of Claim 6, wherein the combination sub-node comprises a plurality of cascaded sub-band filters each operable to block optical traffic in a respective sub-band.

8. (Previously Presented) An optical network, comprising:
an optical ring operable to communicate optical traffic;
a plurality of nodes coupled to the optical ring, each node comprising at least one transport element operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel; and
the plurality of nodes comprising a combination node, the combination node comprising:
a coupler node transport element operable to drop and continue optical traffic passing through the coupler node transport element; and
a hub node transport element cascaded with the coupler node transport element, the hub node transport element operable to selectively pass or terminate from continuing on the optical ring a plurality of individual sub-bands of the optical traffic.
9. (Original) The optical network of Claim 8, wherein the plurality of nodes further comprise a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic.
10. (Original) The optical network of Claim 8, wherein the hub node transport element comprises
a demultiplexer operable to demultiplex the optical traffic into its constituent sub-bands;
a plurality of switches each operable to pass or terminate a respective sub-band; and
a multiplexer operable to multiplex each sub-band passed at the plurality of switches for communication on the optical ring.
11. (Original) The optical network of Claim 10, wherein the demultiplexer and the multiplexer comprise array waveguides.

12. (Original) An optical network, comprising:
an optical ring operable to communicate optical traffic;
a plurality of nodes coupled to the optical ring, each node comprising at least one transport element operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel; and
the plurality of nodes comprising a combination node, the combination node comprising:

a sub-band node transport element operable to terminate a respective sub-band of the optical traffic; and

a hub node transport element cascaded with the sub-band node transport element, the hub node transport element operable to selectively pass or terminate a plurality of individual sub-bands of the optical traffic.

13. (Original) The optical network of Claim 12, wherein the plurality of nodes further comprise a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic.

14. (Original) The optical network of Claim 12, wherein the hub node transport element comprises

a demultiplexer operable to demultiplex the optical traffic into its constituent sub-bands;

a plurality of switches each operable to pass or terminate a respective sub-band; and

a multiplexer operable to multiplex each sub-band passed at the plurality of switches for communication on the optical ring.

15. (Original) The optical network of Claim 14, wherein the demultiplexer and the multiplexer comprise array waveguides.

16. (Original) A method for communicating traffic on an optical network, comprising:

communicating traffic through an optical ring;

passively adding and dropping one or more traffic streams to and from the optical ring at a plurality of nodes coupled to the optical ring, each traffic stream comprising at least one channel;

selectively passing or terminating a plurality of individual sub-bands of the optical traffic at a hub node of the plurality of nodes; and

terminating a plurality of sub-bands of the optical traffic at a plurality of sub-band nodes of the plurality of nodes, each of the plurality of sub-band nodes terminating a respective sub-band.

17. (Original) The method of Claim 16, further comprising dropping and continuing optical traffic passing through a coupler node of the plurality of nodes.

18. (Original) The method of Claim 16, further comprising:

demultiplexing the optical traffic into its constituent sub-bands at the hub node;

passing or terminating a plurality of sub-bands using a plurality of switches, each of the plurality of switches passing or terminating a respective sub-band; and

multiplexing at the hub node each sub-band passed at the plurality of switches for communication on the optical ring.

19. (Original) The method of Claim 18, wherein:

demultiplexing the optical traffic comprises demultiplexing the optical traffic with an array waveguide; and

multiplexing each sub-band passed at the plurality of switches comprises multiplexing each sub-band passed at the plurality of switches with an array waveguide.

20. (Original) The method of Claim 16, wherein terminating a plurality of sub-bands of the optical traffic at a plurality of sub-band nodes comprises blocking a plurality of sub-bands of the optical traffic at a plurality of sub-band nodes using a plurality of sub-band filters.

21. (Original) The method of Claim 16, further comprising terminating a plurality of sub-bands of the optical traffic at a combination sub-band node.

22. (Original) The method of Claim 21, wherein terminating a plurality of sub-bands of the optical traffic at a combination sub-band node comprises terminating a plurality of sub-bands of the optical traffic at a combination sub-band node using a plurality of cascaded sub-band filters, each blocking optical traffic in a respective sub-band.

23. (Original) An optical network, comprising:
an optical ring operable to communicate optical traffic;
a plurality of nodes coupled to the optical ring, each node operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel; and
the plurality of nodes comprising:
a hub node operable to selectively pass or terminate a plurality of individual channels of the optical traffic; and
a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic.

24. (Original) The optical network of Claim 23, wherein the plurality of nodes further comprises a coupler node operable to drop and continue optical traffic passing through the coupler node.

25. (Original) The optical network of Claim 23, wherein the hub node comprises:
a demultiplexer operable to demultiplex the optical traffic into its constituent channels;
a plurality of switches each operable to pass or terminate a respective channel; and
a multiplexer operable to multiplex each channel passed at the plurality of switches for communication on the optical ring.

26. (Original) The optical network of Claim 23, wherein the plurality of sub-band nodes each comprise a sub-band filter operable to block optical traffic in a respective sub-band.

27. (Original) The optical network of Claim 23, further comprising a combination sub-band node operable to terminate a plurality of sub-bands of the optical traffic.

28. (Original) The optical network of Claim 27, wherein the combination sub-node comprises a plurality of cascaded sub-band filters each operable to block optical traffic in a respective sub-band.

29. (Previously Presented) An optical network, comprising:
an optical ring operable to communicate optical traffic;
a plurality of nodes coupled to the optical ring, each node comprising at least one transport element operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel; and
the plurality of nodes comprising a combination node, the combination node comprising:
a coupler node transport element operable to drop and continue optical traffic passing through the coupler node transport element; and
a hub node transport element cascaded with the coupler node transport element, the hub node transport element operable to selectively pass or terminate from continuing on the optical ring a plurality of individual channels of the optical traffic.

30. (Original) The optical network of Claim 29, wherein the plurality of nodes further comprise a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic.

31. (Original) The optical network of Claim 29, wherein the hub node transport element comprises
a demultiplexer operable to demultiplex the optical traffic into its constituent channels;
a plurality of switches each operable to pass or terminate a respective channel; and
a multiplexer operable to multiplex each channel passed at the plurality of switches for communication on the optical ring.

32. (Original) An optical network, comprising:
an optical ring operable to communicate optical traffic;
a plurality of nodes coupled to the optical ring, each node comprising at least one transport element operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel; and
the plurality of nodes comprising a combination node, the combination node comprising:
a sub-band node transport element operable to terminate a respective sub-band of the optical traffic; and
a hub node transport element cascaded with the sub-band node transport element, the hub node transport element operable to selectively pass or terminate a plurality of individual channels of the optical traffic.

33. (Original) The optical network of Claim 32, wherein the plurality of nodes further comprise a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic.

34. (Original) The optical network of Claim 32, wherein the hub node transport element comprises
a demultiplexer operable to demultiplex the optical traffic into its constituent channels;
a plurality of switches each operable to pass or terminate a respective channel; and
a multiplexer operable to multiplex each channel passed at the plurality of switches for communication on the optical ring.

35. (Original) An optical network, comprising:
an optical ring operable to communicate optical traffic;
a plurality of nodes coupled to the optical ring, each node operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel;
the plurality of nodes comprising:
a plurality of hub nodes operable to selectively pass or terminate a plurality of individual sub-bands of the optical traffic; and
a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic;
wherein the plurality of hub nodes form a plurality of photonic domains each operable to communicate different traffic streams in the same sub-bands without interference.

36. (Original) The optical network of Claim 35, wherein the plurality of hub nodes comprises two hub nodes that form two photonic domains.

37. (Original) The optical network of Claim 35, wherein the plurality of hub nodes comprises three hub nodes that form three photonic domains.

38. (Original) The optical network of Claim 35, wherein each hub node comprises:

a demultiplexer operable to demultiplex the optical traffic into its constituent sub-bands;

a plurality of switches each operable to pass or terminate a respective sub-band; and

a multiplexer operable to multiplex each sub-band passed at the plurality of switches for communication on the optical ring.

39. (Original) The optical network of Claim 38, wherein the plurality of switches are reconfigurable to provide optical shared path protection in the event of an error in the network.

40. (Original) The optical network of Claim 39, wherein the error comprises a fiber cut.

41. (Original) An optical network, comprising:
an optical ring operable to communicate optical traffic;
a plurality of nodes coupled to the optical ring, each node operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel;
the plurality of nodes comprising:
a plurality of hub nodes operable to selectively pass or terminate a plurality of individual channels of the optical traffic; and
a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic;
wherein the plurality of hub nodes form a plurality of photonic domains each operable to communicate different traffic streams in the same channels without interference.

42. (Original) The optical network of Claim 41, wherein the plurality of hub nodes comprises two hub nodes that form two photonic domains.

43. (Original) The optical network of Claim 41, wherein the plurality of hub nodes comprises three hub nodes that form three photonic domains.

44. (Original) The optical network of Claim 41, wherein each hub node comprises:

a demultiplexer operable to demultiplex the optical traffic into its constituent channels;

a plurality of switches each operable to pass or terminate a respective channel; and

a multiplexer operable to multiplex each channel passed at the plurality of switches for communication on the optical ring.

45. (Original) The optical network of Claim 44, wherein the plurality of switches are reconfigurable to provide optical shared path protection in the event of an error in the network.

46. (Original) The optical network of Claim 45, wherein the error comprises a fiber cut.

Appendix B: Evidence

NONE

Appendix C: Related Proceedings

NONE